



FY 2005 President's Request

Climate Change Research Initiative

Global Ocean Observing System

Addresses

NOAA Mission Goal #2

Understand
climate variability
and change to
enhance society's
ability to plan and
respond

What is requested?

NOAA Research requests an increase of +\$10.7M and 0 FTE to continue building a Global Ocean Observing System to document climate-scale changes in ocean heat, carbon, and sea level. As part of the Climate Change Research Initiative (CCRI), the Observing System responds to the long-term requirements of NOAA's forecast centers. The CCRI promotes the effective use of scientific knowledge in policy and management decisions through contribution to international research programs and major scientific assessments. The proposed strategy is part of a multi-year phased implementation initiative aligned with the Climate Change Science Program Strategic Plan.

Why do we need it?

The request will result in a better understanding of oceanic processes and improved predictive capabilities through monitoring and research, and will enable NOAA to provide sound scientific advice to those charged with managing the Nation's oceanic and atmospheric resources. Oceans are second only to the sun in affecting seasonal variability and long-term climate change, in part because they serve as both a source and a sink for carbon dioxide, containing over 50 times more carbon than the atmosphere. The request will allow for continued efforts to determine whether circulation patterns are changing, as some models predict, and to predict potential impacts of climate events such as El Niño. More advanced ocean observations are necessary to increase the accuracy of climate change forecasts and predict more immediate impacts from climate-driven phenomena such as changing sea level. Accurate observations are needed for use in climate modeling, determining the rate of change in ocean structure, and in determining changes in ocean circulation that have potential climate impacts.

The ocean observing system under construction is a composite of complementary networks that work together to provide a more complete picture of the oceans' role in climate than any one system could individually describe. Satellites measure global sea surface temperature, sea surface height, and surface winds from space, while *in-situ* sensors directly measure conditions such as salinity. For example, the U.S. contribution to the Argo float array, a global network of floats that profile ocean temperature and salinity, cannot be achieved without support of the ships of opportunity and the dedicated ship time also included in this initiative.

Global Ocean Observing System At-a-Glance

What: +\$10.7M increase
Why: Higher-quality data at finer resolutions are required to increase predictive capabilities of climate change impacts.

Office of Oceanic & Atmospheric Research, Climate Change Research Initiative



The Argo array also cannot effectively function without global measurements supplied through the National Polar-orbiting Operational Environmental Satellite. The satellite altimeters, in turn, must be calibrated using a subset of the tide gauge data. Each component makes a contribution to the whole system.

What will we do?

The funding will advance the *in-situ* networks from an estimated 48% completion in FY 2004 to an estimated 53% completion in FY 2005. The multi-year initiative calls for 99% completion by FY 2009. With its partners, NOAA will upgrade 10 tide gauge stations and install geographic position system (GPS) receivers at selected stations to document sea level changes and provide calibration points for satellite instruments. A global network of ocean reference stations will be advanced to document long-term ocean and atmosphere variability and provide validation points for climate forecast models.

The global surface drifting buoy array will be completed, adding 240 sensors in data sparse regions to measure sea surface temperature and currents and adding wind pressure measurement capabilities. The global tropical moored buoy network will be extended across the Indian Ocean. Dedicated ship support will be provided for deployment of the drifting and moored arrays. Ship support will also be used for a survey of the global oceans to measure carbon content and change. The ships of opportunity network, consisting of volunteer vessels, will be enhanced, concentrating on a subset of high accuracy lines to be frequently repeated and sampled at high resolution for systematic upper ocean and atmospheric measurements. Autonomous carbon dioxide sensors will be added to moored arrays and ships of opportunity to analyze seasonal variability in carbon exchange between the ocean and atmosphere. In addition, key locations in the ocean will be monitored for signs of possible abrupt climate change using the ships, moored, and drifting arrays.

What are the benefits?

In order for society to anticipate and adapt to changes in the Earth's climate system, we must first collect and analyze evidence of long-term variability. Documenting and forecasting sea level changes are essential to making land-use decisions in coastal regions. Documenting the ocean's role in carbon storage and release will also help reduce uncertainties and assist decision makers in establishing policy for potential climate change impacts influencing sectors such as public health, agriculture, and energy. The improved ocean observing system will provide the U.S. and its international partners with critical information on the role of the ocean in climate variability and change.

The advancements funded will allow for more detailed measurements that will fill in existing data measurement gaps and allow the entire system to function more cohesively. Better observations will allow for more accurate predictions and forecasts. More oceanic data, collected at finer resolutions, will allow us to document long-term trends in sea-level change, determine ocean carbon sources and sinks, measure oceanic heat uptake and release, develop better models, improve short-term and seasonal forecasting, and assess long-term trends.

For more
information:

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FY 2005 Proposed Climate Change Research Initiative Program Components:

- Global Ocean Observing System
- Carbon Cycle Atmospheric Observing System
- Aerosols, Clouds, and Climate Change
- Climate Change Computing Initiative



Office of Oceanic and Atmospheric Research
Climate Research
Climate Change Research Initiative

NOAA Budget FY 2005 Change

Global Ocean
Observing System
+\$10.7M
(\$17.3M total)

